PROJECT NUMBER: 1720
PROJECT TITLE: Analytical Microscopy
PROJECT LEADER: V. L. Baliga
WRITTEN BY: K. R. Sanders
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I. LOW SIDESTREAM CIGARETTE PAPERS

A. Objective:

Examine the ultrastructure of selected cigarette papers and paper additives in support of the low sidestream project.

B. Results:

SEM and EDS were used in characterization of a number of Sol Gels, Chemical Additives and Papers in support of the low sidestream project. These techniques have been found to be invaluable in defining subtle differences in structure and particle size of samples for eventual relation to differences in sidestream delivery and visibility.

Comparisons were made of the gross structures of ash from Marlboro Lights 100's, Capri, Virginia Superslims, cigarettes made with $Mg(OH)_2$ paper, and cigarettes made with a sol gel coated paper. Ash from the sol gel paper and the $Mg(OH)_2$ paper maintained their structural integrities similar to their unburned counterparts. They contained what appeared to be "fibers" throughout the ash. The $Mg(OH)_2$ paper formed a crust with "bubbles" on the surface of the ash. The Capri and Virginia Superslims ash was fluffy and granular containing only trace amounts of "fibers". The Marlboro Lights 100's ash crumbled easily and contained no visible "fiber" structure. Ca and P were in all ash samples, and Al was also found in the sol gel ash.

C. References:

1. Yi, G., "Structural and Elemental Characterization of Pulverized Sol Gel," Memo to A. Kallianos, 30 May 1989.
2. Sanders, K., "Characterization of Sol-gel and Reheis Alumina Samples," Memo to A. Kallianos, 13 June 1989.
3. Yi, G., "Elemental and Structural Characterization of $MgAl_2O_4$ Powder," Memo to A. Kallianos, 18 June 1989.
4. Baliga, V., and Henry, B., "Characterization of Two Magnesium Phosphates and Two Aluminum Phosphates," Memo to J. Paine, 11 May 1989.
5. Sanders, K., "Characterization of $CaCO_3$ Samples," Memo to K. Podraza 15 June 1989.
6. Sanders, K., "Characterization of $CaCO_3$: Comparison of Samples Ground and Not Ground," Memo to K. Podraza 19 June 1989.
7. Sanders, K., "Characterization of Al_2O_3/Fe_2O_3 Sample," Memo to J. Fournier 21 June 1989.
8. Yi, G., "Structural and Elemental Characterization of Cigarette Paper Ash," Memo to F. Del Valle, 18 May 1989.

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9. Yi, G., "Structural and Elemental Characterization of Experimental Paper Ash," Memo to S. Baldwin, 14 June 1989.

II. ART

A. **Objective**: Examine samples for the continuing research and development efforts of the ART Pilot Plant.

B. **Results**:

Stem widths were measured from three samples of stems which were cut at 150 cuts per inch (0.167mm) then dried and equilibrated. The mean values were; Bermuda 100, 0.33 ± 0.13mm; Bermuda 100 exit Cutter #1, 0.27 ± 0.1mm; Louisville, 0.28 ± 0.1mm[1].

Three samples of DL-5 ART shreds were examined to determine if there were any gross morphological differences between the samples as a result of added sprays. One had water sprayed on, the second had ammonium hydroxide, and the third had ammonium bicarbonate. In all samples, the normal tobacco morphology was maintained. No distinguishing crystalline structures were noted on the surfaces.

C. **References**:

1. Henry, B., and Baliga, V., "Comparison of Cut Stem Widths from Bermuda 100 and Louisville," Memo to J. Baggett, 6 June 1989.
2. Sanders, K., "Characterization of ART Lamina," Memo to R. Prasad, 16 June 1989.

III. SUPPORT TO OPERATIONS

A. **Objective**: Examine samples for support to operations.

B. **Results**:

A stainless steel plate used as part of the machinery of the RCB casting process was received for documentation of a coating that was visible on one of its surfaces. The coating provided a smooth surface over the plate. It was comprised of particles ≤ 0.2μ in size, and contained primarily Ca with P and Si. Particles > 0.2μ in size which were not a part of the coating were noted on the surface. These contained Na, Mg, Al, Si, P, S, Cl, K, and Ca.

C. **References**:

Sanders, K., "Documentation of Coating on Stainless Steel Plate" Memo to G. Gellatly, 19 June 1989.

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